

Short communication

Effect of different levels of boron and its methods of application on growth and yield of cauliflower (*Brassica oleracea* var. *botrytis* L.)

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Cauliflower (*Brassica oleracea* var. *botrytis* L.) is an important vegetable crop of the plateau region of Chhotanagpur. Due to mild favourable temperature, cauliflower is grown almost throughout the year. The crop is highly remunerative and farmers get high return. The crop suffers from Boron deficiency (dead heart rot and hollow stem) in acidic soils of the region specially during the rainy season. Application of Boron significantly overcomes these problems and results in increased curd yield (Kotur and Kumar, 1980).

Though, prevailing temperature is suitable for growing cauliflower, soil fertility is not as good as compared to the plains of the state. The physico-chemical properties of the experimental plot indicated that the soil was sandy loam in texture. The values of organic carbon ranged between 0.48 and 0.49%; available nitrogen 128 and 151%; available phosphorus 38.11 and 38.31; available potash 34.80 and 35.28 kg/ha; while, available Boron ranged between 0.46 and 0.44 ppm during both the years of experimentation (2003-05). The pH values ranged between 5.5 and 5.6, i.e., slightly acidic in reaction with E.C. value of 0.18 and 0.22 dsm^{-1} during the year 2003 and 2005, respectively. Thus the soil fertility status of

the experimental plot indicated low organic carbon content and available phosphorus and potash during the year of experimentation.

Present experiment was conducted at Birsa Agricultural University, Kanke, Ranchi, (Jharkhand), in the experimental area during the year 2003 and 2005, to study the effect of different levels of Boron and its methods of application on yield and other ancillary characters of Cauliflower. There were 5 levels of Boron B_1 (1.0 kg/ha), B_2 (1.50 kg/ha), B_3 (2.0 kg/ha), B_4 (2.50 kg/ha) and B_5 (3.0 kg/ha), and 5 methods of its application viz; M_1 (broadcast in one dose), M_2 (broadcast in two doses), M_3 (band application in one installment), M_4 (band application two installments) and M_5 (Foliar spray). Thus, there were altogether 26 treatment combinations along with control. The seeds were sown in the first week of October in both the year (2003 and 2005) and seedlings were transplanted with a spacing of 60 x 30 cm in the last week of October in a factorial randomized block design with three replications. The plot size was 9 m^2 and the number of plants per plot was 50. All the cultural operations were provided in time and plant protection measures were also adopted properly. The harvesting of the crop commenced from 1st week of January and continued till last week of January during both the years of experimentation. Accordingly, the observations on curd yield and other ancillary characters were recorded.

Effect of different levels of Boron differed significantly among themselves in respect of all vegetative and reproductive characters. Increasing levels of Boron from 1.0 kg/ha to 2.50 kg/ha showed linear increase in all the characters and was significantly superior to control, while the highest level i.e. 3.0 kg B/ha could not prove superior to control. The maximum value of all the characters viz; plant height (63.98 cm), number of leaves (16.25), plant

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Table 1: Effect of different levels of Boron and its method of application on growth and yield contributing characters of Cauliflower.(Pooled).

Characters Treatments	Plant Height (cm.)	Plant grith (cm.)	Plant weight (g.)	Curd weight (g.)	Curd diameter (cm.)	Curd depth (cm.)	Yield (q/ha)
M ₁ (Broadcast in one dose)	53.12	3.22	1076.46	505.72	14.19	9.39	277.95
M ₂ (Broadcast in two doses)	55.13	3.36	1136.47	544.21	14.62	10.01	302.44
M ₃ (Band appl ^l in one installment)	56.27	3.43	1172.24	569.24	14.68	10.40	316.23
M ₃ (Band appl ^l in two installment)	56.27	3.57	1277.88	640.78	15.98	11.14	375.97
M ₅ (Foliar spray)	56.27	3.43	1119.95	563.40	14.76	10.21	312.98
C.D. at 5%	2.73	0.18	49.33	25.40	0.52	0.34	12.35
B ₁ (1.0 Kg B/ha.)	56.02	3.40	1183.27	582.45	15.04	10.34	343.69
B ₂ (1.5 Kg B/ha.)	61.47	3.75	1341.53	686.73	16.26	11.52	401.50
B ₃ (2.0 Kg B/ha.)	58.05	3.61	1210.87	575.53	15.06	10.33	319.73
B ₄ (2.5 Kg B/ha.)	53.83	3.26	1110.16	531.12	14.42	9.90	295.06
B ₅ (3.0 Kg B/ha.)	49.80	2.98	937.17	447.52	13.45	9.06	248.61
CD at 5%	2.74	0.19	49.32	25.39	0.53	0.34	12.36
B ₁ M ₁	53.10	3.22	1092.56	520.16	14.05	8.85	289.00
B ₁ M ₂	55.23	3.36	1158.46	564.26	14.95	10.35	314.00
B ₁ M ₃	56.47	3.43	1211.12	605.92	15.40	10.60	336.61
B ₁ M ₄	58.78	3.57	1246.69	619.99	15.20	11.20	421.47
B ₁ M ₅	56.52	3.43	1211.51	605.91	15.60	10.70	336.61
B ₂ M ₁	58.82	3.57	1243.00	616.00	15.05	11.10	442.21
B ₂ M ₂	60.85	3.71	1321.42	673.42	16.60	11.60	374.11
B ₂ M ₃	61.88	3.79	1366.16	707.36	16.35	11.65	392.97
B ₂ M ₄	63.98	3.92	1439.30	758.70	16.85	12.25	446.20
B ₂ M ₅	61.82	3.78	1337.75	678.15	16.45	11.00	376.73
B ₃ M ₁	55.14	3.43	1110.62	515.92	14.90	9.60	286.61
B ₃ M ₂	57.26	3.57	1142.63	525.83	14.05	9.80	292.11
B ₃ M ₃	58.62	3.64	1191.56	564.26	14.65	10.25	313.47
B ₃ M ₄	60.70	3.78	1418.56	707.36	16.95	11.95	392.97
B ₃ M ₅	58.55	3.64	1190.96	564.26	14.75	10.05	313.47
B ₄ M ₁	51.42	3.08	1029.07	477.87	13.95	9.25	265.47
B ₄ M ₂	53.16	3.22	1092.96	520.16	14.25	9.65	289.00
B ₄ M ₃	54.19	3.29	1109.02	525.82	14.00	10.00	292.11
B ₄ M ₄	56.22	3.43	1210.73	605.93	15.90	10.50	336.61
B ₄ M ₅	54.17	3.29	1109.03	525.83	14.00	10.10	292.11
B ₅ M ₁	47.10	2.79	907.05	398.65	13.00	8.15	221.47
B ₅ M ₂	49.15	2.94	966.86	437.36	13.25	8.65	242.97
B ₅ M ₃	50.21	3.01	983.34	442.84	13.02	9.50	246.00
B ₅ M ₄	52.22	3.15	1078.12	515.92	15.00	9.80	286.61
B ₅ M ₅	50.30	3.01	950.50	442.84	13.00	9.20	246.00
CD at 5%	6.10 (NS)	0.39	110.29	46.94	1.17	0.76	27.61
Control	48.12	2.88	906.25	387.45	12.60	8.10	215.23
Control vs Others	2.20	0.14	39.60	16.85	0.42	0.26	9.91

weight (1439.30 g), curd weight (758.70g), curd diameter (16.85 cm), curd depth (12.25 cm) and yield (446.20q/ha) were recorded in the plots receiving Boron @1.50 kg/ha. While the minimum viz; 48.12 cm., 2.88 cm. , 906.25g, 387.45 g, 12.60cm., 8.10 cm and 215.23 q/ha. was noted in the control plots.

Similarly, the effect of methods of application differed significantly in respect of all the characters. The maximum values of these characters were recorded with band application of Boron in two installments. The maximum values were recorded as plant height (58.38 cm), number of leaves (15.02), plant weight (1277.88 g), curd weight (640.78 g), curd diameter (15.61 cm), curd depth (11.00 cm) and yield (375.97 q/ha.) while the minimum values were recorded under control, respectively.

Analyzed pooled data (Table 1) clearly indicated that the different doses of Boron and its methods of application had produced significant interaction effect. The treatment having 1.50 kg B/ha applied as band application in two installments recorded the highest values of plant height (63.98 cm), number of leaves (16.25), plant weight (1439.30 g), curd weight (758.70g), curd diameter (16.85 cm), curd depth (12.25 cm), yield (446.20 q/ha) followed by 61.88 cm, 1418.56 g, 707.36 g, 16.60 cm, 11.95 cm, 442.21 q/ha, respectively under the application of B_2M_3 . The minimum figures of these characters were recorded under the control. The increase in the curd weight by Boron application may be due to its role in enhancing

the translocation of carbohydrates from the site of its synthesis to the storage tissue in the curd as Boron is known to play beneficial role in the translocation of carbohydrates which helps in better seed orl fruit set. (Sisler, *et. al*; 1956) These findings also are in conformity with the findings of Kumar and Choudhary (2002), Singh (2003) as well as Pizeetta *et al.* (2005) in Cauliflower.

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